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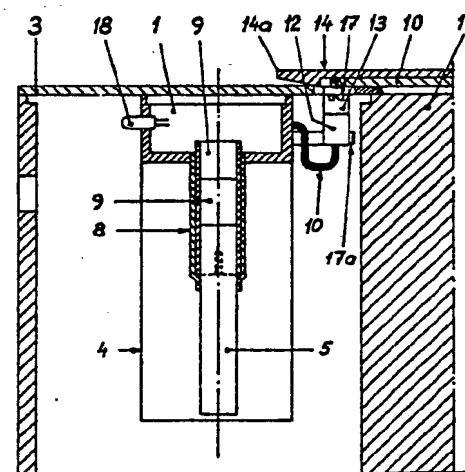
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(54) Title: ELECTRODE MEANS FOR WATER PURIFIER ACCORDING TO THE IONIZATION PRINCIPLE  
PREFERABLY FOR SWIMMING POOLS

## (57) Abstract

The invention concerns an electrode means for the purification of water according to the ionization principle and has at least two electrodes (4, 5), one of which consisting of copper (4). The electrodes are placed on the bottom side of a contact box (1) by means of a lid (3) that is of larger size than the bottom of the box so that the box remains hanging on the pavement of the pool, when the box is lowered into the skimmer.



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ELECTRODE MEANS FOR WATER PURIFIER ACCORDING TO THE IONIZATION PRINCIPLE,  
PREFERABLY FOR ISWIMMING POOLS.

When a current through two electrodes is passing a leading liquid in a well-known manner, positively charged ions will move towards the negative electrode and negatively charged ions towards the positive electrode. This process is hereby called the ionization principle.

Water purifiers according to the principle above have been known previously. The effectiveness of the principle is well-known, but has so far been of little use due to too high installation and maintenance costs.

The present invention reduces these costs considerably, through the fact that the purifier can be purchased as a "do-it-yourself-unit" that can be stalled by the pool owner himself.

The invention will be further explained in connection with the enclosed drawing and the following description.


The accomplishment of the invention, an electrode means, refers to the figures 1, 2, 3, 4, 5 and 6.

- Fig. 1 Front picture of the electrode means
- Fig. 2 Lateral view of the electrode means
- Fig. 3 Top view of electrode means
- Fig. 4,5 show a detail of the electrode means
- Fig. 5 also shows a detail of the electrode means
- Fig. 6 shows a current regulating means
- Fig. 7 shows a variant of the invention
- Fig. 8 shows a further embodiment of the invention.

The electrode means according to fig. 1-3 has been accomplished to be placed in the pool, either by submerging it into the skimmer or by being hung on to the edge of the pavement of the pool. The skimmer is the top outlet of the pool, which is combined with a tin containing a roughing filter consisting of a cup with a grating.

The electrode means consists of a water-proof box 1 (Fig. 1 and 2) that in its inside has four pillars for the fastening of the lid (3) (Fig. 1, 2 and 3) by means of the screws 6 (Fig. 3).

The two electrodes 4, preferably made of sheet, stainless steel, have been fastened into the box by means of screws 6 and joined together in the box. The electrode 5, preferably of a cylindric copper rod, has been inserted into a tube 7, preferably made of stainless steel, which tube has been slotted so that spring contact is achieved against the electrode 5.



A rubber hose 8 is the caulking between 5 and 7. The tube 7 has been fastened in the box 1 by means of fitting. The plug 9, squeezed into the tube 7, decides how far the electrode 5 can be pushed into the tube 7. The electrodes are provided with current through the two-threaded wire 10 which has been squeezed into the wall of the contact box and through a water-proof electric plug 12 and 13, has been drawn across the pavement of the pool 11, and is protected by a rail 14, which has a slot 15 (Fig. 4) or a socket 16 (Fig. 5).

The one part of the plug (13) has been fastened in the rail 14 by means of screws 17 and the other part (12) in the contact box by means of a screw 17 a. The rail 14 has been fixed to the pavement of the pool, for example through screws. The lid 3 should be of such a size, larger than the bottom, that it covers the opening of normally existing skimmers. When the contact box with the lid and electrodes is to be placed in the skimmer, the end 14 a of the rail 14 is lifted so that the part of the plug 12 will come in under the part 13, after which 14 a is pressed down so that the parts of the plug are pushed into each other.

In a similar way the electrodes are removed, when the roughing filter in the skimmer is to be cleansed. An indicating lamp, preferably a light diode 18, has been squeezed into the wall of the box 1 (Fig. 1) and a resistance 19 (Fig. 6) is connected in a series with the light diode. An extra fitting and caulking of the plug 9, the cable 10, the tube 7 and light diode 18 is achieved in an uncomplicated way with glue, for example of epoxy type.

The generating means can be accomplished in the ordinary way, for example according to the German patent writing 2150670. The principle is shown in Fig. 6. At the field tests that have been carried out with the here current invention, the generating means mentioned has been modified so that the part B, that gives the wanted times for ionization in various current directions, has been exchanged for an integrated circuit with the symbol LM 555.

The time means 3 should be dimensioned so that the electrode 4 has a plus potential with a longer time interval than the electrode 5, for example the electrode 4 has a plus potential for 25 seconds and the electrode 5 minus for 22 seconds. Moreover, the ampere meter A has been moved to the collectors of the outlet transistors. The centre of the transformer is grounded through a connection D to the ground of the lighting network.

It is also to be seen from Fig. 6 how an indication means, for example a light diode 18 in a series with a resistance 19, sensitive to current direction, is connected between the electrodes.

It is favourable to connect a tension indicating means to the electrodes, which is placed next to them, or is placed elsewhere through a wire, because in this way one is able to check that there is no shortcircuit or between the conductors, joined to these. Through the fact that the indication means is sensitive to current direction and the time interval is different in the two current directions, it is also possible to check that the two conductors between the current supply and the electrodes have not been exchanged. By means of a light diode, or two, indicating one current direction each, one obtains a simple indication means. Via wires the indication means can be placed at an arbitrary place.

The plug 12 and 13 (Fig. 2) can be dispensed with if the cable loop 10 is made so long (reaches the skimmer) that it allows the electrodes to be lifted up. When the electrode means is placed on the pavement of the pool and hangs down the edge, the lid 3 is to be prolonged to the right (Fig. 2) with at least 150 mm so that the rail 14 can press the lid so much that the electrodes are hanging almost vertically.

When the electrode means is placed on the pool edge it is suitable to protect the electrodes totally or partly, preferably its sides facing the pool. This should be done with a perforated plastic cover which can be fastened in the contact box 1 and/or in the electrodes 4. The electrode means should be placed where the water flows, for example by one of the inlets of the pool.

Fig. 7 shows one way of realizing the invention, where part 12 of the electric plug is fastened on the wall of the skimmer, for example by means of a self-threaded screw and the part 13 on the lid 3. The electric plug can naturally be dispensed with, if the cable of the cable loop 10 is made long enough. The rail 14 protecting the cable 10 (Fig. 2 and 4) can be dispensed with, if the cable is placed in a slot or tubes arranged in the wall of the pool of pavement.

Finally, Fig. 8 shows how the electrode means can be placed in the engine house. A container 20 is then attached, in which the electrodes 4 and 5 are placed. The container 20 has a lid 21, which in the ordinary way is fastened with bolts and caulked with a packing 22. The electrodes 4 and 5 are fastened in the lid 21 in the same way as in the bottom of the contact box in the above described way of realization according to Fig. 1-6. The lid has a cylinder shaped part 27, which is provided with a lid 24. In this way

a space is achieved, which corresponds to the contact box 1 in fig. 1-3, in which a connection of the cable 10 and the turning of the signal lamp 18 is performed. The container 20 has a screwed socket 28 for incoming water, for example from the pool, and a socket 29 for outgoing water. The container 20 can be provided with a strainer 30 (roughing filter) placed in its bottom part.

The wall of the container should be provided with a window or be made of transparent material so that the electrodes and the roughing filter can be inspected without the removal of the lid 21. In order to facilitate the cleansing of the filter and electrodes the container 20 is provided with legs 31 or similar, so that the lid will be in the correct working height above the floor. The container is provided with a flange 25 and an outlet 32 enabling the water piercing through when the lid 21 is removed, despite the fact that taps are off before and after the container, can be diverted and will not come on the floor or the engine house.

The attachment of the container 20 can be in an arbitrary place in the circulation system, but as a rule it is easiest between the taps of the pipes from the pool and the tap (switch) at the sand filter, because in this way no additional taps have to be installed.

The pipe attachment is so easily performed, by means of the connection parts for attachment of plastic pipes that are now available, that it can be carried out according to the "do-it-yourself principle".

The electrode 4 should be of material resistant to electrolysis, such as graphite, molybdenum or of stainless steel of high quality, for example an alloy of Cr-17 %, Ni-12 %, Mo=2,7 % max 0.5% C and the rest Fe.

The power means according to Fig. 6 is connected to the circulation pump so that the electrodes are provided with power when the pump is working. Against germs in the pool, for example coli-germs, silver is added, for example through the fact that one of the electrodes 4 or the rod is made of silver or silver-copper.

It is to be seen from the description above that an ionization purifier at a low cost can be installed by the pool owner himself without utilizing experts for plumbing and electric installation work.

If, for example, one should have to interrupt the mains voltage to the pump

motor or the power generating means, when the electrode means is lifted from the pool, a reed relay can be placed in the contact box opposite the plug part 13 and a permanent magnet is attached in 13. The cable 10, preferably a ribbon cable, is hereby provided with an additional conductor connected to the reed contact and with the help of an operating relay the functions wanted, for example of the just mentioned kind, are performed.

Naturally the invention is not restricted to water purification in pools but can also be utilized by all kinds of water bodies, for example water reservoirs, fish ponds etc.

## WHAT I CLAIM IS:

1.

Electrode means for the purification of water in pools (swimming pools) according to the ionization principle with at least two electrodes (4,5), at least one of which consisting of copper or a copper alloy, characterized by the fact that the electrodes mentioned are fastened in a box (contact box 1) and that the copper electrode mentioned etc. (5) is in a water-proof and elastic way fastened to the bottom of the box, e.g. with a rubber hose (8) and that contact organs are placed within the caulking (rubber hose), e.g. a slotted stainless tube (7), which has contact with the copper electrode etc., when this is slipped through the elastic tube, at the same time as the electrodes inside the box are also connected to a cable, drawn through the walls of the box for current feed of the electrodes.

2.

Electrode means according to patent claim 1, characterized by the fact that the lid (3) of the box being of larger size than the bottom of the box, so that when the box is submerged into the water in the skimmer of the pool (spillway) or down to the water of the pool by the edge of the pavement of the pool (11), the contact box remains hanging on the lid butting against the top of the pavement.

3.

Electrode means for water purifiers according to patent claim 1, where at least one electrode (4) is manufactured by a material that is resistant to electrolysis, e.g. stainless steel, and the other electrode (5) manufactured by copper or copper-silver and that the voltage that is conducted to the electrodes changes direction of poles with an in advance determined interval, characterized by the fact that the copper electrode etc. is fed by a minus potential during a certain period of time, for example 22 seconds, and the electrode is resistant to electrolytic plus potential with a longer interval than for example 25 seconds.



4.

Electrode means for water purifiers according to patent claim 1, characterized by the fact that a protective rail (14) is placed on the pavement of the pool to protect the cable (10), provided with part (13) of an electric plug and the lid (3) and the box (1) with the other part (12) of the plug, through which the contact between the parts of the electric plug is interrupted when the protective rail (14) but not the box, is lifted up, as a result of which the current to the electrodes going through the plug is broken.

5.

Electrode means according to patent claim 1, characterized by the fact that a reed relay is fastened inside the contact box and a permanent magnet in the pool opposite the reed relay so that the reed relay is operated when the lid of the contact box is lifted from the pavement of the pool and for example interrupts the current to the electrodes.

6.

Electrode means according to patent claim 1, characterized by the fact that the electrodes are placed in a container (20, fig. 8), with inlet and outlet (28,29) for the water of the pool and preferably placed near the circulation pump and the lid (21) of the contact box being the lid of the container, this being transparent preferably, so that the electrodes can easily be inspected.

7.

Electrode means according to patent claim 6, characterized by the container (20) having a flange (25) outside the lid (21) and an outlet (32), through which the water, that is flowing out when the lid is removed, is diverted.

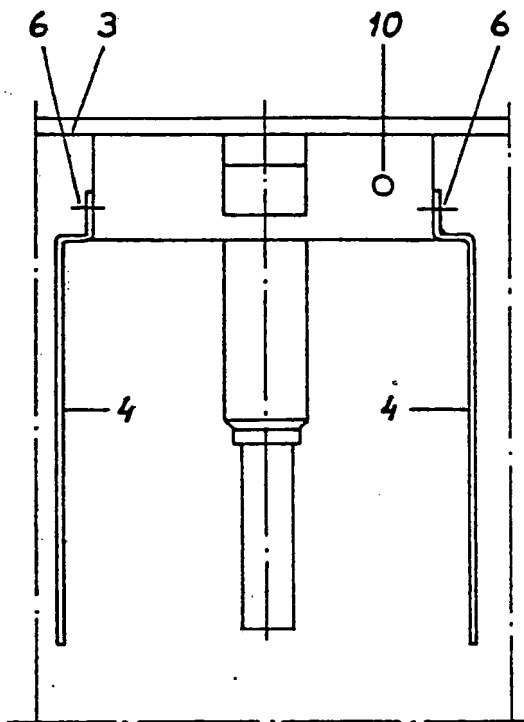


Fig. 1

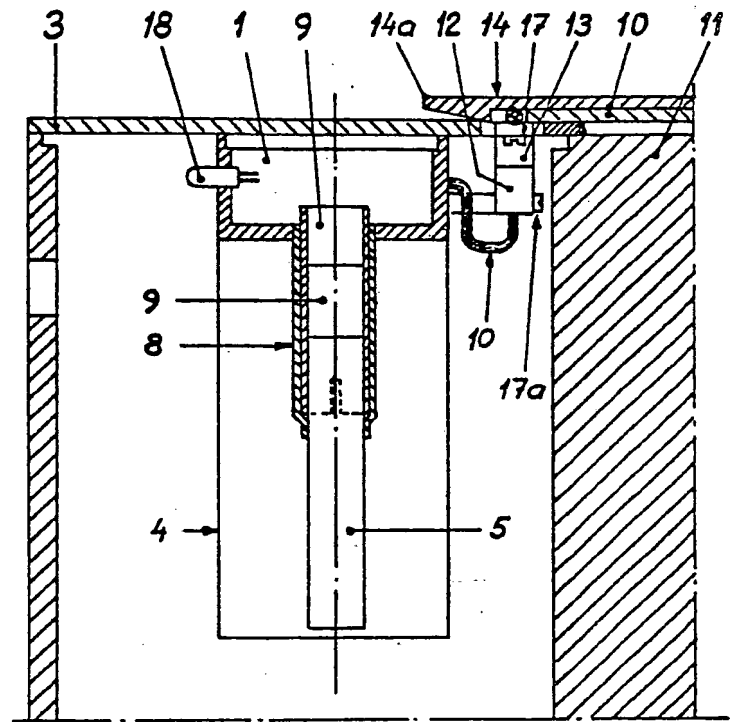


Fig. 2

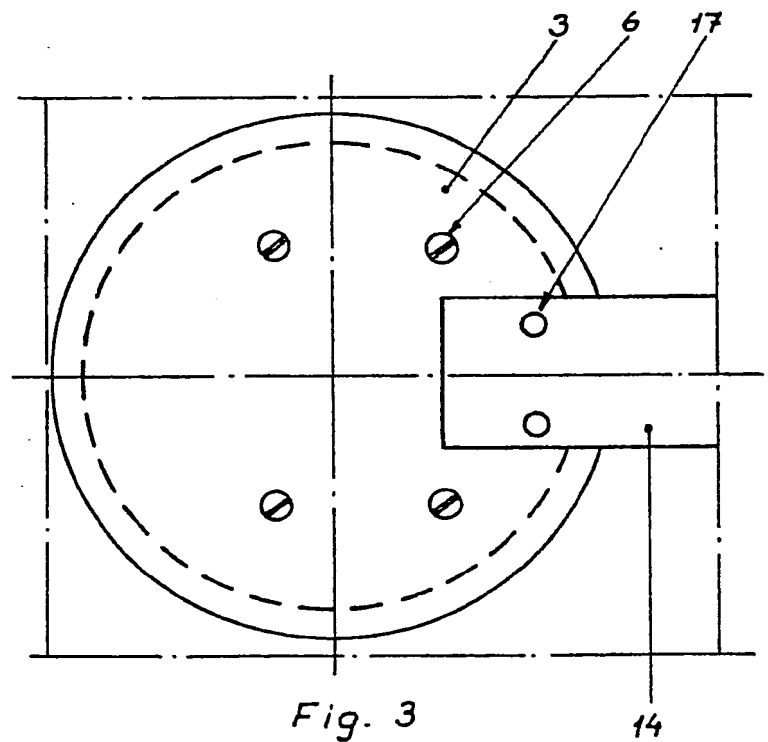


Fig. 3

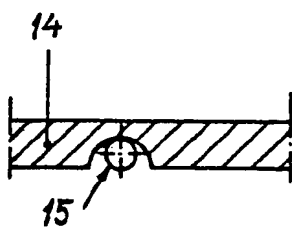


Fig. 4

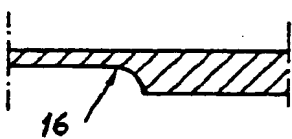


Fig. 5

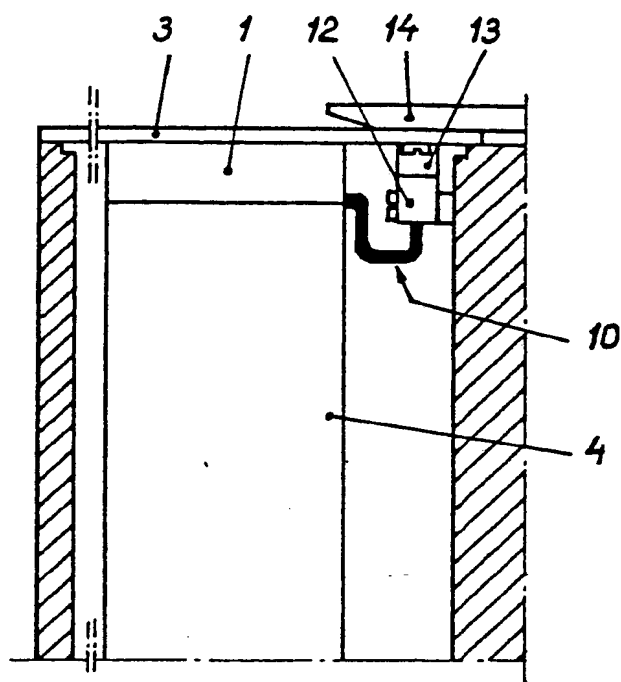


Fig. 7

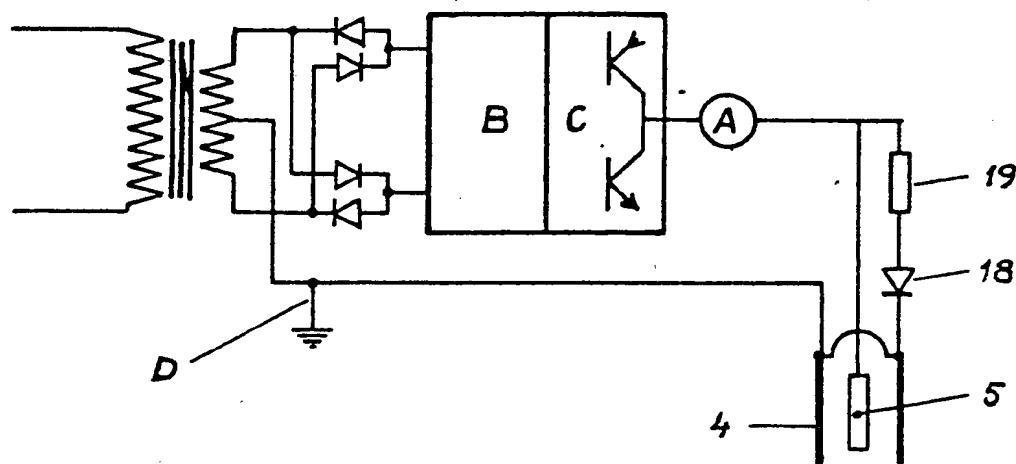


Fig. 6

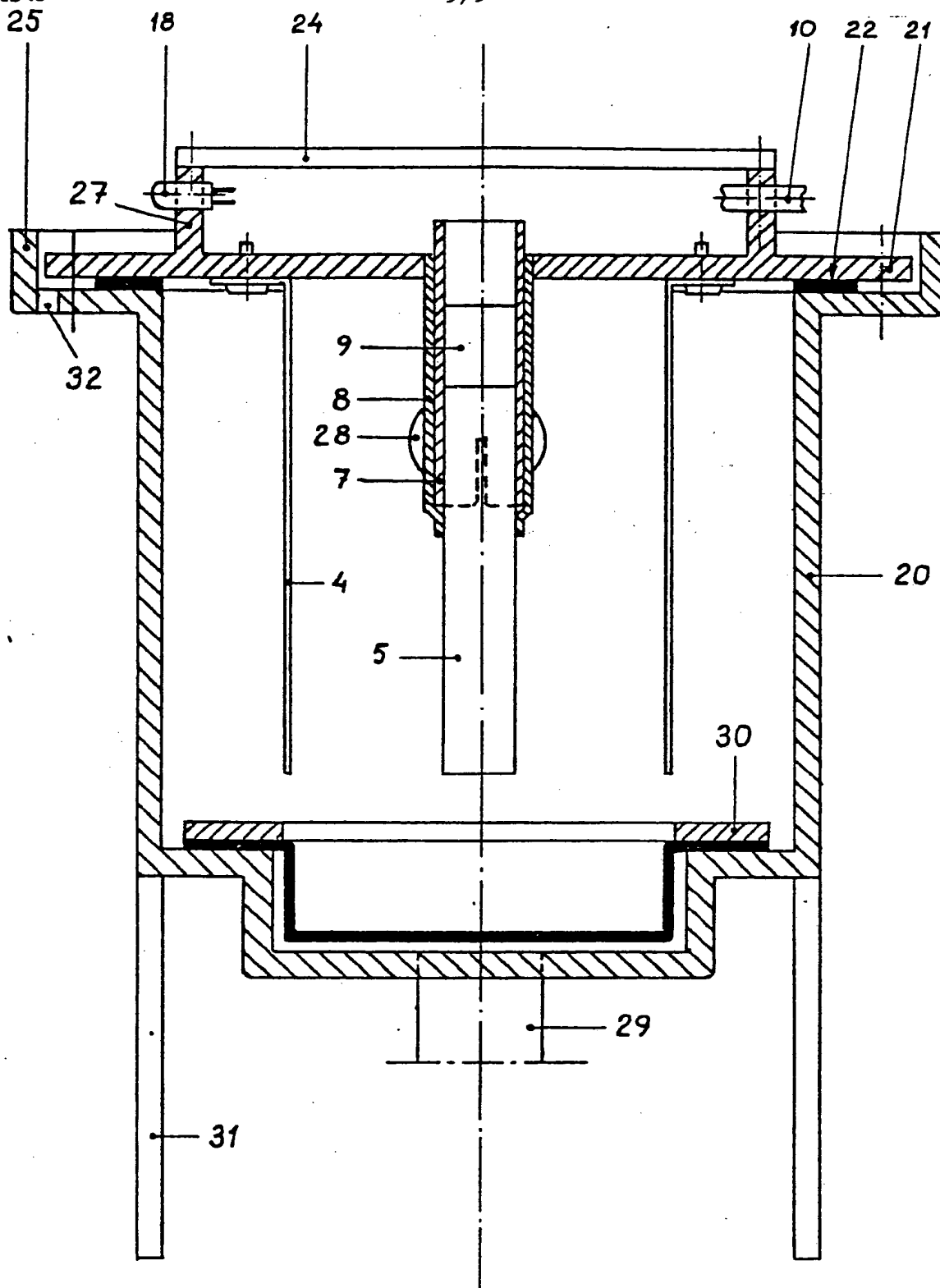


Fig. 8

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/SE85/00311

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC 4		
C 25 B 11/00, C 02 F 1/46, 1/50 // E 04 H 3/20		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched 7		
Classification System	Classification Symbols	
IPC 4 US C1	C 25 B 11/00, /02; C 02 F 1/46, /50 204:130, 149, 186, 242, 302; 210:169	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched 8		
SE, NO, DK, FI classes as above		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT 9</b>		
Category 9	Citation of Document, 11 with indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13
X	US, A, 4 337 136 (V.M.F. DAHLGREN) 3 June 1982, See fig. 2 and 3.	1-7
X	DE, A, 2 035 198 (DEUTSCHE PERLITE GMBH) 27 January 1972, See p. 4, lines 11-16	3
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<b>IV. CERTIFICATION</b>		
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